

APPLICATION OF AIRBORNE RADAR AND GIS TO SAN CLEMENTE ISLAND ARCHAEOLOGY

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The DoD and DoE are legally required to locate and care for cultural resources on lands they control. Much is unsurveyed and current methods are slow and expensive. Presently over 19 million acres of DoD land alone are unsurveyed. In the western US surveys cost \$30-\$35 per acre, far more in the heavily vegetated eastern US. Evaluation and mitigation are required before site disturbance. Delays and significant schedule impact can occur should archaeological sites inadvertently be discovered. We seek to evaluate JPL AIRSAR multiparameter radar imagery and TOPSAR high resolution digital elevation data (<http://airsar.jpl.nasa.gov/>) as a tool to help locate environments likely to contain sites, or even directly detect some classes of sites. The radar imagery is collected at three wavelengths (~68cm or "P-Band", ~24cm or "L-Band", and ~5.6cm or "C-Band") and full polarization diversity (HH, HV, VV, VH, where H=horizontal, V=vertical polarization, first letter is transmit polarization, second letter is receive polarization). Resolution is up to 1m per pixel (picture element). TOPSAR topographic data is achieved in an interferometric mode. Phase variations in radar echoes simultaneously received at two antennas are used to calculate topography. TOPSAR digital elevation models (DEMs) have vertical resolutions as high as 1.5 m. These attributes are unique to AIRSAR. This potentially allows characterization the landscape in terms of its use by native peoples, enhancing standard analysis procedures. Our initial study location is San Clemente Island, offshore southern California. For our purposes, this site has many positive features. The northern part is well surveyed archaeologically, and data for the island is available in GIS format. The southern part is less well characterized, providing a well controlled "unknown" study site. Because the island has been controlled by the Navy for many years, modern cultural effects are reduced. Meanwhile, the cultures are identical to those well studied onshore. At present, AIRSAR and TOPSAR data have just been collected and analysis is underway. Preliminary study of these data indicate that they will be useful for assessment of DoD/DoE lands, and provide an additional tool for archaeological assessments.